Hantavirus Pulmonary Syndrome

Also known as: Hantavirus Disease, HPS, Sin Nombre Virus

Responsibilities:
Hospital: Report by IDSS, facsimile, mail or phone
Lab: Report by IDSS, facsimile, mail or phone
Physician: Report by facsimile, mail or phone
Local public health agency (LPHA): Follow-up required

Iowa Department of Public Health
Disease Reporting Hotline: (800) 362-2736
Secure Fax: (515) 281-5698

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Agent

The genus *Hantavirus*, family Bunyaviridae, comprises at least 14 viruses, including those that cause hemorrhagic fever with renal syndrome (HFRS) and hantavirus pulmonary syndrome (HPS). Hantaviruses are primarily rodent-borne.

Hantavirus pulmonary syndrome (HPS) occurs in the U.S. with most of the cases being associated with Sin Nombre virus (SNV). Other agents include Black Creek Canal virus and Bayou virus.

HFRS is caused by puumala virus in Europe. Seoul virus, which is widely distributed, also causes HFRS of variable severity as does Hantaan virus, which is found principally in Asia. Renal failure and hemorrhagic manifestations, common in HFRS, have been mild or absent in most recognized cases of HPS.

B. Clinical Description

Symptoms: during the 3 to 5 day prodrome are non-specific flu-like symptoms, including fever, fatigue, and muscle aches, especially in the large muscle groups. Gastrointestinal manifestations or dizziness may also occur.

Onset: As the disease progresses, symptoms can include cough and shortness of breath as the lungs fill with fluid. Once the cardiopulmonary phase begins, the disease progresses rapidly, necessitating hospitalization and often assisted ventilation within 24 hours.

Complications: of HPS include an acute febrile illness that progresses rapidly to severe respiratory failure (acute respiratory distress syndrome or ARDS) and shock. The mortality rate is still not well known but appears to be approximately 40%. For survivors, recovery from the acute illness is rapid with apparent restoration of normal lung function.

C. Reservoirs

Common reservoirs: The main reservoir for Sin Nombre virus is the deer mouse, *Peromyscus maniculatus*, native to most of the United States.

Less Common reservoirs: Black Creek Canal virus is associated with the cotton rat, *Sigmodon hispidus*, is found in the southeastern U.S. The rice rat, *Oryzomys palustris*, found in the southern U.S., is a reservoir for Bayou virus.

D. Modes of Transmission

Infected rodents shed live virus in their saliva, feces and urine.
Airborne: Humans are infected when they inhale dust that contains dried contaminated rodent urine or feces. Transmission may also occur when dried materials contaminated by rodent feces or urine are disturbed and are directly introduced into broken skin or the eyes, nose or mouth.

Person-to-person: There is no evidence of person-to-person transmission of HPS in the United States.

E. Incubation period

The incubation period is weakly defined, but is thought to be approximately 2 weeks, with a range of a few days to 6 weeks.

F. Period of Communicability or Infectious Period

Person to person spread of hantaviruses appears to be rare, but further study is needed.

G. Epidemiology

HPS was first recognized in 1993 following an outbreak in the southwestern United States. As of November, 2013, 585 cases have been identified in the U.S. About 75% of patients with HPS have been residents of rural areas. Most cases have occurred in spring or summer, although cases have occurred throughout the year. Cases of HPS have also been reported in Canada and in several countries in South America. Anyone whose occupational activities (biologists, pest-control workers, etc.) or recreational activities (hikers, campers, etc.) put them in frequent contact with rodents or their droppings are potentially at risk. Disturbing, cleaning or inhabiting closed, actively rodent-infested structures is an important risk factor.

H. Bioterrorism Potential

Category C agent. Third-highest priority agents include emerging pathogens that could be engineered for mass dissemination in the future because of availability, ease of production and dissemination and potential for high morbidity and mortality and major health impact.

2) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To assess the magnitude of the disease in different areas and among different risk groups.
- To identify outbreaks as soon as possible.
- To identify rodent sources of infection.
- To monitor the emergence of HPS in new areas and new risk groups.
- To design more effective control or prevention methods.

B. Laboratory and Healthcare Provider Reporting Requirements

Iowa Administrative Code 641-1.3(139) stipulates that the laboratory and the healthcare provider must report. The preferred method of reporting is by utilizing the Iowa Disease Surveillance System (IDSS). However, if IDSS is not available, the reporting number for IDPH Center for Acute Disease Epidemiology (CADE) is (800) 362-2736; fax number (515) 281-5698, mailing address:

IDPH, CADE
Lucas State Office Building, 5th Floor
321 E. 12th St.
Des Moines, IA 50319-0075

Postage-paid disease reporting forms are available free of charge from the clearinghouse.
Call (319) 398-5133 or visit the website
healthclrhouse.drugfreeinfo.org/cart.php?target=category&category_id=295 to request a supply.

Laboratory Testing Services Available

The University of Iowa State Hygienic Laboratory (SHL) tests for hantavirus. For more information on submitting specimens contact SHL at (319) 335-4500, or visit: www.shl.uiowa.edu/

C. Local Public Health Agency (LPHA) Follow-up Responsibilities

Case Investigation

a. Case investigation of hantavirus disease in Iowa residents will be directed by the IDPH Center for Acute Disease Epidemiology (CADE).

b. Following notification of IDPH, the LPHA(s) may be asked to assist in completing an official IDPH investigation. Access the Iowa Disease Surveillance System (IDSS) to conduct the investigation. Interview the case and/or others who may be able to provide information to complete the investigation form and then enter into IDSS. Most of the information required can be obtained from the healthcare provider or the medical record. Use the following guidelines to assist in completing the form:
   1) Record "Hantavirus Disease" (or "Hantavirus Pulmonary Syndrome") as the disease being reported.
   2) Record the case's demographic information.
   3) Record the date of symptom onset, symptoms, date of diagnosis, hospitalization information (if applicable), and outcome of disease (*e.g.,* recovered, died).
   4) Exposure history: Use the approximate incubation period range for hantavirus (1-6 weeks). Specifically, focus on the period beginning about 1 week prior to the case's onset date back to approximately 6 weeks before onset for the following exposures:
      a) Travel history: Determine the date(s) and geographic area(s) visited by the case.
      b) Rodent contact: Ask the case about potential direct or indirect occupational or recreational exposure to rodents and/or rodent droppings. Document in the "Notes" section.
   5) Complete the import status section to indicate where hantavirus was acquired. If unsure, check "Unknown." Include any additional comments regarding the case.
   6) If several attempts have been made to obtain case information, but have been unsuccessful (*e.g.,* the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please enter as much information as can be gathered. If the information cannot be obtained, please explain the reason in the "Notes" section in IDSS. If using IDSS, select the appropriate reason under the Event tab in the Event Exception field.

c. If IDSS is not being used, after completing the form, attach lab report(s) if available and mail (in an envelope marked "confidential") to IDPH Center for Acute Disease Epidemiology. The mailing address is:

   IDPH, CADE
   Lucas State Office Building, 5th Floor
   321 E. 12th Street
   Des Moines, IA 50319-0075

d. Institution of disease-control measures is an integral part of case investigation. It is the LPHA's responsibility to understand, and, if necessary, institute the control guidelines below.

3) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements

None.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

Reported Incidence Is Higher than Usual/Outbreak Suspected

If any cases of Hantavirus infection are reported in your county or if an outbreak is suspected, investigate to determine the source of infection and mode of transmission. Consult with an epidemiologist at CADE at (800) 362-2736. CADE can help determine a course of action to prevent further cases and perform surveillance for cases that may cross several county lines and therefore be difficult to identify at a local level.

D. Preventive Measures

Environmental Measures

The best way to prevent HPS is to eliminate or minimize human contact with rodents.

- Clear brush, grass, and garbage from around building foundations to eliminate a source of nesting materials. Keep tight-fitting lids on all garbage.
- Use metal flashing around the base of wooden, earthen or adobe dwellings to provide a strong metal barrier.
- Seal all entry holes one-fourth inch wide or wider with lath screen or lath metal, cement, wire screening or other patching materials, inside and out.
- Elevate hay, woodpiles and garbage cans to eliminate possible nesting sites.
- Use an EPA-approved rodenticide with bait under plywood or plastic shelter along baseboards, or trap and properly dispose of rodents. Live trapping of rodents is not recommended.
- Clean all food-preparation areas. Store all food (both human and pet) in rodent-proof containers.
- Do not leave open bowls of pet food outside. Discard any uneaten pet food properly at the end of the day.

Preventive Measures/Education

People involved in cleaning rodent-contaminated areas should keep the following in mind:

- Clean droppings using a wet method, rather than a dry method such as sweeping or vacuuming. Spray disinfectant, such as dilute bleach, prior to cleaning and use a wet mop or towels moistened with disinfectant to clean. This prevents dust from being produced.
- Work in well-ventilated areas. If possible before cleaning areas that have been closed for prolonged periods, open windows and allow to air out for 24 hours before initiating cleaning.
- In areas of heavy infestation gloves, dust-mist masks, long-sleeved clothing, and protective eyewear may help prevent exposure.

4) ADDITIONAL INFORMATION

The Council of State and Territorial Epidemiologists (CSTE) surveillance case definitions for Hantavirus can be found at: www.cdc.gov/osels/ph_surveillance/nndss/phs/infdis.htm#top

CSTE case definitions should not affect the investigation or reporting of a case that fulfills the criteria in this chapter. (CSTE case definitions are used by the state health department and the CDC to maintain uniform standards for national reporting.)

References

American Academy of Pediatrics. *2006 Red Book: Report of the Committee on Infectious Diseases, 66th Edition*. Illinois, American Academy of Pediatrics, 2006.
CDC Website. Hantavirus, *www.cdc.gov/hantavirus/*
Heymann, D. L., ed. *Control of Communicable Diseases Manual, 20th Edition.* Washington, DC: American Public Health Association, 2015.

Additional Resources

www.nlm.nih.gov/medlineplus/ency/article/001382.htm